WE CLAIM:

1. A method for enhancing fairness and performance in a multihop ad hoc network, the method comprising:

providing contention synchronization information regarding a transmission between a first set of nodes of the network, wherein the information is provided to a second set of nodes in a range of two hops from the first set of nodes participating at the transmission; and

setting, after successfully finishing the transmission, a waiting time for the first set of nodes, in which the first set of nodes backoff from accessing a transmission medium.

2. The method according to claim 1, wherein, in the providing step, the contention synchronization information is provided by generating a first black burst energy signal by each node in a third set of nodes receiving a transmission request or a transmission clearance, the first black burst energy signal indicating a busy time of the transmission medium according to a mapping scheme.

3. The method according to claim 2, wherein, in the providing step, the method accords to a Distributed Coordination Function.

4. The method according to claim 3, wherein, in the providing step, the method accords to the Distributed Coordination Function defined by the 802.11 standard for Wireless Local Area Networks of the IEEE.

5. The method according to claim 3, wherein, in the providing step, the transmission request comprises a Request-to-Send packet, the transmission clearance comprises a first Clear-to-Send packet, and the waiting time comprises a time for a Request-to-Send/

Clear-to-Send-handshaking and a total backoff time of a minimum contention window.

6. The method according to claim 5, further comprising:

backing off by a first node using a random value uniformly chosen between 0 and $CW_{min}$ before accessing a channel, when a first packet arrives to a Medium Access Control Layer from a higher layer;

generating a second black burst energy signal according to the mapping scheme, when a second node receives a Request-to-Send or Clear-to-Send not for itself, wherein the second black burst energy signal is not sent if the second node detects the channel is busy;

receiving the second black burst energy signal by a third node and attempting to access the channel by the third node for limited times before an end point of the time indicated by the second black burst energy signal, wherein these attempts are not added to retransmission times for the first packet;

starting a backoff timer at the end point of the time indicated by the second black burst energy signal by using a random value uniformly chosen between 0 and $CW_{min}$, while a first contention window for the third node is not reset, if the third node detects the channel is idle,

wherein only an earliest time point is used if more than one black burst energy signal is received; and

waiting for a time period after a successful transmission, before a sender node and a receiver node access the channel again, wherein length of the time period comprises the time for the Request-to-Send/ Clear-to-Send-handshaking and the total backoff time of the minimum contention window.

7. The method according to claim 6, wherein, in the receiving step,

the end point of the time indicated by the second black burst energy signal is calculated according to:

$$T_i = T_{curr} + T_{SIFS} + T_{CTS} + T_{TR} + T_{BB} + T_{DATA},$$

wherein $T_{curr}$ is a time when the second black burst energy signal is received and $T_{BB}$ is a transmission time for the second black burst energy signal.

8. The method according to claim 6, wherein, in the receiving step, the end point of the time indicated by the second black burst energy signal coincides with an end of a DATA packet frame, if the second black burst energy signal was generated due to a second Request-to-Send packet, and wherein the end point of the time indicated by the second black burst energy signal is near a finish time of an ACK frame with a difference of turnaround time plus second black burst energy signal transmission time, if the second black burst energy signal was generated due to a second Clear-to-Send packet.

9. A system for enhancing fairness and performance in a multihop ad hoc network, the system comprising:

providing means for providing contention synchronization information regarding a transmission between a first set of nodes of the network, and for providing the information to a second set of nodes in a range of two hops from the first set of nodes participating at the transmission; and

setting means for setting a waiting time for the first set of nodes after a successful finish of the transmission, in which the first set of nodes backoff from accessing a transmission medium.

10. The system according to claim 9, further comprising a first node for receiving a transmission request or a transmission clearance, and for

generating a black burst energy signal by each such receipt, the black burst energy signal indicating a busy time of the transmission medium according to a mapping scheme, thus providing the contention synchronization information.

11. The system according to claim 10, the system further comprising a Wireless Local Area Network.

12. The system according to claim 11, the Wireless Local Area Network being in accordance with the 802.11 standard for Wireless Local Area Networks.

13. The system according to claim 11, wherein, in the first node, the transmission request comprises a Request-to-Send packet, the transmission clearance comprises a Clear-to-Send packet, and the waiting time comprises a time for a Request-to-Send/ Clear-to-Send-handshaking and a total backoff time of a minimum contention window.

14. The system according to claim 13, further comprising a second node, a sender node, and a receiver node, wherein:

the sender node is configured to back off using a random value uniformly chosen between 0 and $CW_{min}$ before accessing a channel, when a packet arrives to a Medium Access Control Layer from a higher layer;

the second node is configured to generate a black burst energy signal according to the mapping scheme, when the second node receives a Request-to-Send or Clear-to-Send not for itself, wherein the black burst energy signal is not sent if the second node detects the channel is busy;

the second node is configured to receive the black burst energy signal and attempt to access the channel for limited times before an end point of a

time indicated by the black burst energy signal, wherein these attempts are not added to retransmission times for the packet;

the second node is configured to start a backoff timer at the end point of the time indicated by the black burst energy signal by using a random value uniformly chosen between 0 and $CW_{min}$, while a contention window for the second node is not reset, if the second node detects the channel is idle,

wherein only an earliest time point is used if more than one black burst energy signal is received; and

the sender node and the receiver node are configured to wait for a time period after a successful transmission, before the channel is accessed again, wherein length of the time period comprises the time for the Request-to-Send/ Clear-to-Send-handshaking and the total backoff time of the minimum contention window.

15. The system according to claim 14, wherein, in the second node, the end point of the time indicated by the black burst energy signal is calculated by the first set of nodes according to:

$$T_i = T_{curr} + T_{SIFS} + T_{CTS} + T_{TR} + T_{BB} + T_{DATA},$$

wherein $T_{curr}$ is a time when the black burst energy signal is received and $T_{BB}$ is a transmission time for the black burst energy signal.

16. The system according to claim 14, wherein, in the second node, the end point of the time indicated by the black burst energy signal coincides with an end of a DATA packet frame, if the black burst energy signal was generated by a third node due to a Request-to-Send packet, and wherein the end point of the time indicated by the black burst energy signal is near a finish time of an ACK frame with a difference comprising turnaround time and black burst energy signal transmission time, if the black burst energy

signal was generated by a fourth node due to a Clear-to-Send packet.

17. A Wireless Local Area Network node, wherein:

the node is configured to back off using a random value uniformly chosen between 0 and $CW_{min}$ before accessing a channel, when a packet arrives to a Medium Access Control Layer from a higher layer;

the node is configured to generate a black burst energy signal according to a mapping scheme, when the node receives a Request-to-Send or Clear-to-Send not for itself, wherein the black burst energy signal is not sent if the node detects the channel is busy;

the node is configured to receive the black burst energy signal and attempts to access the channel for limited times before an end point of a time indicated by the black burst energy signal, wherein these attempts are not added to retransmission times for the packet;

the node is configured to start a backoff timer at the end point of the time indicated by the black burst energy signal by using a random value uniformly chosen between 0 and $CW_{min}$, while a contention window for the node is not reset, if the node detects the channel is idle,

wherein only an earliest time point is used if more than one black burst energy signal is received; and

the node is configured to wait for a time period after a successful transmission, before the channel is accessed again, wherein length of the time period comprises a time for a Request-to-Send/ Clear-to-Send-handshaking and a total backoff time of a minimum contention window.

18. The node of claim 17, wherein the node is in accordance with standard 802.11 for Wireless Local Area Networks of the IEEE.

19. The node according to claim 17, wherein, in the node, the end point of the time indicated by the black burst energy signal is calculated by the node according to:

$$T_i = T_{curr} + T_{SIFS} + T_{CTS} + T_{TR} + T_{BB} + T_{DATA},$$

wherein $T_{curr}$ is a time when the black burst energy signal is received and $T_{BB}$ is a transmission time for the black burst energy signal.

20. The node according to claim 17, wherein, in the node, the end point of the time indicated by the black burst energy signal coincides with an end of a DATA packet frame, if the black burst energy signal was generated by the node due to a Request-to-Send packet, and wherein the end point of the time indicated by the black burst energy signal is near a finish time of an ACK frame with a difference comprising turnaround time and black burst energy signal transmission time, if the black burst energy signal was generated by the node due to a Clear-to-Send packet.

21. A system for enhancing fairness and performance in a multihop ad hoc network, the system comprising:

a first processor for providing contention synchronization information regarding a transmission between a first set of nodes of the network, and for providing the information to a second set of nodes in a range of two hops from the first set of nodes participating at the transmission; and

a second processor for setting a waiting time for the first set of nodes after a successful finish of the transmission, in which the first set of nodes backoff from accessing a transmission medium.